MODIS Surface Reflectance; BRDF/Albedo Parameter

Product Description

The BRDF/Albedo Parameter provides (1) coefficients for mathematical functions that describe the BRDF of each pixel in the seven MODIS "Land" bands (1-7); and (2) albedo measures derived simultaneously from the BRDF for bands 1-7 as well as three broad bands (0.4-0.7; 0.7-3.0, 0.4-3.0 μm). Because deriving BRDF and albedo requires merging multiple looks at each pixel, the BRDF/Albedo parameter is provided every 16 days. Its spatial resolution is 1 km, gridded to Level 3. A thirty-day summary albedo product at one-quarter degree spatial resolution is also provided.

Research & Applications

The BRDF functions provided by the BRDF/Albedo parameter (1) allow normalization of MODIS data to standard viewing and illumination angles, thus removing geometric effects from multidate images; (2) quantify the directional information in the remotely-sensed signal, which is related to ground cover type; and (3) provide a surface radiation-scattering model for boundary layer parameterization in regional and global climate modeling. The BRDF is also used in extraction of surface reflectances at Level 2. Two albedo measures are provided: "black-sky" albedo (directional-hemispherical reflectance), and "white-sky" albedo (bi-hemispherical reflectance). These are intrinsic surface properties, independent of atmospheric state. They describe the upward scattering of the solar beam and of uniform diffuse irradiance, respectively, and may be used as input to global and regional climate models.

Data Set Evolution

The BRDF/Albedo algorithm combines gridded, multidate, multiband surface reflectance data from EOS MODIS and MISR instruments to produce BRDF functions and derived albedo measures. For each grid cell, all cloud-free observations in a 16-day period are assembled and fit to a suite of semi-empirical models that describe the BRDF as a linear function of basic BRDF shapes. The shapes are derived by simplifying physical models that describe volume scattering and surface scattering of land surface covers. In addition, a single empirical model (modified Walthall) is also fitted. The algorithm outputs (1) the model and parameters that best fit the observations, (2) modified Walthall parameters, (3) black-sky and white-sky spectral and broadband albedos, (4) an extensive series of quality flags, and (5) information on model fits and surface structure inference.

Suggested Reading

Barnsley, M.J. and J.-P. Muller, 1991.

Brest, C.L., and S.N. Goward, 1987.

Wanner, W., *et al.*, 1995.

Wanner, W., *et al.*, 1995.

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PRODUCT SUMMARY

Coverage:
global land surface

Spatial/Temporal Characteristics:
1 km, 16-day; 1/4° 30-day

Key Science Applications:
biogeochemical cycle modeling, net primary productivity estimation, global climate models

Key Geophysical Parameters:
bidirectional reflectance, spectral albedo

Processing Level:
3

Product Type:
standard, at-launch

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